

ARS

(1)

5/24/90

Dr Bajotta

Honduras ^{manuel}
Guatemala
Belize

Dr Reyes
El
Salvador

Dr Wyss

Dr Bram

DIDE

Current Status

May 6 - last confirmed
case

Control Zone

Surveillance zone 19°
92°30'

Guat 80 field inspector
Bel 6 " "

2 temporary quarantine
stations

Cases 23 MX
1320 Gua
124 Bel

(2)

5/24/90

Status of E-88

9 days oviposition

2 L 00 hrs

56 hr Starting

2 L 40

32 Floor 1

6 64

88 " 2

10 88

F₂₆

pupation 16 hrs

presently in F₃₆

yield ca 60%

Biologa Lopez

QC Data Compare OW-87 & E-88

ow-87 lower emergence

acceptable

Villalobos

3

5/20/90

6-3-3 1.2

Super Fly Complete diet

Babblona

Pelcen gel - 80

concentrate of hydrolyzed
protein of animal
origin

savings \$89 K

Brewer

Gel extenders

4-8% gel extenders
reduce water lock by $\frac{1}{2}$

8% looks good

(4)

5/24/90

MARTIN

3 different regimens

7-3-3 -

Spent media handling

CaCl₂ 2%

40% todos

60% liquido

Mackley

Production

Ad Hoc
Committee

- ① Standardization
 - Data management
 - Rearing Procedures
 - Equipment
 - Sampling procedures
- ② Larval diet
 - replace formol
 - Dietary requirements
 - during growths
 - Pattern of consumption
 - of larval diet
- ③ Larval quality
 - Relationship between time
 - of moulting & quantity
 - Starting room

(4)

Colony & oviposition.

- 1 Broodstock selection
at larval stage
- 2 Oviposition stimulant
egging once/day

2:1 spent gel. ←

Dave

654 % recombination

Chilled fly

— 5-8000' sea level

- Yield 70-90% flies

Dan garga

9 pens

(7)

5/24/90

15⁺ disper Apr 6-10
SION

1 mass/day⁷

Welch

Octenol

Phenomone
29 Carbon
1 meo~~th~~
1 AceO-

SCREWORM RESEARCH AND METHODS DEVELOPMENT MEETING

TUXTLA GUTIERREZ, CHIAPAS, MEXICO

MAY 24, 1990

N A M E	INSTITUTION
RALPH A. BRAM	USDA-ARS, BELTVILLE, MD
CARLOS BAJATTA CARPIETTE	CMAEGBG
C. J. WHITTEN	USDA-ARS TUXTLA
MVZ. HIDROMIRO HERNANDEZ DIAZ	SUBDIRECTOR PRODUCCION MEX.
MV. MIGUEL A. REYES KNOKE	COORDINADOR DEL PROGRAMA G.B. EL SALVADOR, C.A.
J. C. BRUCE	COORDINATOR BELIZE
MANUEL WILLS	MINISTERIO RECURSOS NATURALES, HONDURAS
MVZ. SERGIO J. MARTINEZ GUZMAN	ASESOR DE LA DIRECCION DE LA COMISION MEXICO-AMERICANA, MEXICO, D.F.
JAIME ORTEGA POLO	SECRETARIO TECNICO CMA EGBG, MEXICO, D.F.
BIOL. RENE GARCIA RODRIGUEZ	JEFE DPTO. DE METODOS PLANTA.
MVZ. AMET HERNANDEZ CLEMENTE	DESARROLLO DE METODOS (PLANTA)
MVZ. RAUL SELVAS A.	JEFE DE SEGURIDAD BIOLOGICA - PLANTA.
ING. ALFREDO LOPEZ VILLALOBOS	JEFE DE LA UNIDAD DE INVESTIGACION - METODOS (PLANTA)
LOUIS IVEY	JEFE REG. REGION B TUXTLA

N A M E

INSTITUTION

IBQ. LUIS ALBERTO ALVAREZ PAREDES	JEFE DE UNIDAD DE DESARROLLO DE CEPAS
MVZ. LUIS LOPEZ VELAZQUEZ	SUBJEFE DE UNIDAD DESARROLLO DE CEPAS
BIOL. LUIS ENRIQUE LOPEZ REYES	JEFE DE UNIDAD DE DESARROLLO DE METODOS
MVZ. CESAR OMAR BLUNO DGUEZ.	ARS
ING. ELIUD CANTU	SUPERVISOR DE IRRADIACION
STEVE SMITH	SUBDIRECTOR FIELD OPERATIONS - MEXICO, D.F.
MVZ. MANUEL MATA MARTINEZ	JEFE DE LA UNIDAD DE SEGURIDAD E HIGIENE. PLANTA.
BIO. TEC. SANTANA MUNOZ	PRODUCCION PLANTA
IBQ. YOLANDA REYES CARBAJAL	ARS
IBQ. ROSALINDA RODRIGUEZ	ARS
BILL FUHRMAN, DVM	APHIS, IS - SCREWORM EPIDEMIOLOGY
BIOL. REYNALDO MOCTEZUMA ROMAN	D.I.D.E.
BIOL. IRENE LOPEZ GONZALEZ	D.I.D.E.
I.I.Q. MARTIN DIAZ MUNDO	A.R.S.
MV. JORGE ALFREDO CALDERON	JEFE DESARROLLO METODOS, GUATEMALA, C.A.
MVZ. MA. CONCEPCION SILVA MORA	JEFE DE UNIDAD DESARROLLO DE METODOS, MEXICO, D.F.
ENTOMOLOGO ART FLORES	PRODUCCION

N A M E

INSTITUTION

QUIM. JOSE LUIS BADILLO GLZ.	DESARROLLO DE METODOS
ELIAS AWE	DIFUSION - PROGRAMA BELICE
DAVID TAYLOR	ARS, FARGO, ND
JOHN B. WELCH	ARS, SAN JOSE, COSTA RICA
DOUG BREWER	ARS, TUXTLA GUTIERREZ
DONALD B. THOMAS	ARS, TUXTLA GUTIERREZ
EDWARD F GERSABECK	STAFF OFFICER, HYATTSVILLE, MANYLAND
TOM R. ASHLEY	APHIS, IS - TUXTLA
DAVID W. ANDERSON	SUBDIRECTOR GENERAL, MEXICO, D.F. APHIS - IS
JOHN H. WYSS	CO-DIRECTOR, MEXICO, D.F. APHIS - IS
ROQUE JONAPA M.	DESARROLLO DE METODOS TUXTLA
FLOYOL P. HORN	USDA, ARS, SOUTHERN PLANIS AREA COLLEGE STATION, TX
JULI CESAR ESTRADA R.	DESARROLLO DE METODOS, TUXTLA.

AGENDA

Final
Agenda

JUNTA TECNICA
"TECHNICAL MEETING"

DEPTO. DE INVESTIGACION Y DESARROLLO EXP./A.R.S.
"DEPARTMENT OF METHODS DEVELOPMENT AND
AGRICULTURAL RESEARCH SERVICE"

PLANTA PRODUCTORA DE MOSCAS
"SCREWORM PRODUCTION FACILITY"

TUXTLA GUTIERREZ, CHIAPAS, MEXICO

24 DE MAYO DE 1990

"MAY 24, 1990"

DR. BRAM/"DR. BRAM"
MODERADOR /"MODERATOR"

- | | | |
|-------|---|----------------------------|
| 09:00 | Llamar a Orden.
"Call to Order" | MVZ. Irastorza/Dr. Wyss |
| 09:10 | Bienvenida.
"Welcome" | MVZ. Hernández/Dr. Hofmann |
| 09:20 | Condición del Programa de
Erradicación.
"Status of the Erradication
Program" | MVZ. Bajatta/Dr. Anderson |
| 09:30 | Introducción.
"Introduction" | Biól. García/Dr. Ashley |
| 09:40 | Condición de la Cepa G-88.
"Status of Strain G-88" | MVZ. López Velázquez |
| 09:50 | Comparación de la Cepa OW-87
con la Cepa G-88.
"Comparison of OW-87 and
G-88 Strain" | Biól. López González |
| 10:00 | Resumen sobre las Cepas.
"Overview on Strain Status" | Dr. Whitten |
| 10:10 | Receso.
"Coffee Break" | |

- 10:20 Evaluación de la Dieta Completa Superfly.
"Evaluation of the Complete Superfly Diet" Ing. López Villalobos
- 10:30 Utilización Pelcer Gel-80 Como Sustituto de la Torta de Carne de Caballo.
"Utilization of Pelcer Gel-80 as a Substitute for the Horsemeat Patty" Erick Babilonia MSMB.
- 10:40 Ecología del Gusano Barrenador en Costa Rica.
"Screwworm Ecology in Costa Rica" Dr. Welch
- 10:50 Dietas Larvarias Fortificada con Acidos Aminos Seleccionados.
"Larval Diets Fortified with Selected Amino Acids" Dr. Friese
- 11:00 Extensibles a la Dietas Larvarias de Gel.
"Extenders of Gelled Larval Diets" Dr. Brewer
- 11:10 Régimens de Alimentación Larvaria.
"Larval Diet Feeding Regimens" Biol. Díaz Mundo
- 11:20 Modelo de Dinámicas de Población del Gusano Barrenador.
"Model of Screwworm Population Dynamics" Dr. Whitten
- 11:30 Observaciones Ecológicas en el Norte de Africa.
"Ecological Observations in North Africa" Dr. Thomas
- 11:40 Medios de Pupación Alternos.
"Alternative Pupation Medias" Dr. Brewer
- 11:50 Atrayentes del Gusano Barrenador Investigados en el Campo.
"Screwworm Attractant Research in the Field" Dr. Welch

- 12:00 Envios de Largo-Alcance de
Pupas Irradiadas.
"Long-range Shipments of
Irradiated Pupae" Dr. Whitten
- 12:10 Manejo y Uso de dieta de
Desecho Tipo Gel.
"Handling and Use of spent
gel diet" IBQ. Alvarez Paredes
- 12:20 Almuerzo.
"Lunch"
- 13:00 Disposición de tiempo en el
Comportamiento de los Gusanos
Adultos en su actividad diaria.
"Time-Activity Budget of Adult
Screwworm Behavior" Dr. Thomas
- 13:10 Cooperación Técnica con 'IAEA'.
"Technical Cooperation
with IAEA" Dr. Whitten
- 13:20 Estatus de las Pruebas de Mosca
Aletargada.
"Status of Chilled Fly Tests" MVZ. Martinez/Ing. Hughes
- 13:30 Apoyo Investigativo a Crianza
Masiva: Perspectivas del Depto.
de Producción.
"Research Support for Mass
Rearing Production Department
Perspective" MVZ. Hernández/Dr. Mackley
- 13:40 Planes Futuros del D.I.D.E.
"Future Methods Development
Plans" Biol. García/Dr. Ashley
- 13:50 Planes Futuros de A.R.S.
"Future ARS Plans" Dr. Whitten
- 14:00 Sumario y Conclusiones.
"Summary and Conclusions" MVZ. Irastorza/ Dr. Wyss
- 14:20 Clausura de la Junta.
"Adjournment" Dr. Bram
- 14:30 Refrigerios
"Refreshments"

AGENDA

REUNION ANUAL "ANNUAL MEETING"

DEPTO. DE INVESTIGACION Y DESARROLLO EXP. Y A.R.S.
"DEPARTMENT OF METHODS DEVELOPMENT AND THE
AGRICULTURAL RESEARCH SERVICE"

PLANTA PRODUCTORA DE MOSCAS
"SCREWORM PRODUCTION FACILITY"

CHIAPA DE CORZO, CHIAPAS, MEXICO
24 DE MAYO DE 1990
"MAY 24, 1990"

<u>HORARIO</u>	<u>T E M A R I O</u>	<u>PONENTES</u>
09:00	Apertura y objetivos "Call to Order"	MVZ. M. Irastorza Dr. J. H. Wyss DR. R. Bram (Moderador)
09:10	Bienvenida. "Welcome"	MVZ. H. Hernández Dr. C. Hofmann
09:15	Estado Actual del Programa de Erradicación. "Status of the Erradication Program"	MVZ. C. Bajatta Dr. D. Anderson
09:25	Introducción. "Introduction"	Biól. R. García Dr. T. Ashley
09:35	Condición de la Cepa G-88. "Status of Strain G-88"	MVZ. L. López V.

HORARIOTEMARIOPONENTES

09:45	Comparación entre las Cepas OW-87 y G-88. "Comparison of OW-87 and G-88 Strains"	Biól. I. López G.
09:55	Resumen sobre las Cepas. "Overview of Strain Status"	Dr. J. Whitten
10:05	Receso. "Coffee Break"	
10:20	Evaluación de la Dieta Completa Superfly. "Evaluation of the Complete Superfly Diet"	Ing. J. A. Villalobos
10:30	Utilización de Pelcer Gel-80, como Sustituto de la Torta de Carne de Caballo. "Utilization of Pelcer Gel-80 as a Substitute for the Horsemeat Patty"	MSMB. E. Babilonia
10:40	Dieta Reforzada con Animoácidos "Larval Diets Fortified with Selected Amino Acids"	Dr. D. Friese
10:50	Extendedores a la Dieta Larvaria de Gel. "Extenders of the Gelled Larval Diet"	Dr. D. Brewer

HORARIOT E M A R I OPONENTES

11:00	Régimens de Alimentación Larvaria. "Larval Diet Feeding Regimens"	Biól. M. Díaz
11:10	Manejo y Uso de Dieta de Desecho Tipo Gel. "Handling and Use of Spent Gel Diet"	MVZ. L. A. Alvarez
11:20	Medios de Pupación Alternos "Alternative Pupation Medias"	Dr. D. Brewer
11:30	Apoyo de Investigación en la Crianza Masiva: Perspectivas del Depto. de Producción. "Research Support for Mass Rearing: Production Department Perspective"	MVZ. L. Hernández Dr. J. Mackley
11:40	Almuerzo "Lunch"	
12:30	Estado de Sexado Génético. "Status of Genetic Sexing"	Dr. D. Taylor
12:40	Modelo de Dinámica de Población del G.B.G. "Model of Screwworm Population Dynamics"	Dr. J. Whitten
12:50	Ecología del Gusano Barrenador en Costa Rica. "Screwworm Ecology in Costa Rica"	Dr. J. Welch

Enzyme Linked
Immuno System
ELISA Assay

HORARIOT E M A R I OPONENTES

13:00	Observaciones Ecológicas en el Norte de Africa. "Ecological Observations in North Africa"	Dr. D. Thomas
13:10	Estado Actual del Proyecto de Mosca Aletargada "Status of Chilled Fly Project"	MVZ. S. Martínez Dr. D. Bailey
13:20	Centro de Dispersión para la Mosca Aletargada. "Dispersion Center for Chilled Fly"	Biól. R. Moctezuma Ing. E. Hughes
13:30	Estudios del Campo con la Mosca Aletargada. "Field studies with Chilled Flies"	MVZ. R. Selvas
13:40	Atrayentes del G.B.G. Investigados en el Campo. "Screwworm Attractant Research in the Field"	Dr. J. Welch
13:50	La Fermona Femenina "The Female Pheromone"	Dr. D. Taylor
14:00	Envíos Distantes de Pupas Irradiadas. "Long-range Shipments of Irradiated Pupae"	Dr. J. Whitten

HORARIOT E M A R I OPONENTES

✓ 14:10	Resultados de Trampa "Tipo Australia" en Guatemala. "Results of the Australian Type Trap in Guatemala"	MVZ. A. Calderón
✓ 14:20	Comportamiento Diario del Adulto de G.B.G. "Adult Screwworm Behavior"	Dr. D. Thomas
✓ 14:30	Cooperación Técnica con I.A.E.A. "Technical Cooperation with IAEA"	Dr. J. Whitten
✓ 14:40	Planes Futuros de A.R.S. "Future ARS Plans"	Dr. Whitten
✓ 14:50	Planes Futuros del D.I.D.E. "Future Methods Development Plans"	Biól. R. García Dr. T. Ashley
15:00	Resumen y Conclusiones. "Summary and Conclusions"	MVZ. Irastorza Dr. J. Wyss Dr. R. Bram
15:10	Clausura. "Adjournment"	Dr. R. Bram
15:20	Refrigerio "Refreshments"	

May 14, 1990

SUBJECT: Annual ARS-Methods Development Meeting, May 24, 1990

TO: All ARS Scientists at Tuxtla and San Jose

FROM: C.J. Whitten, RL

Enclosed is a copy of the agenda proposed for the annual ARS-Methods Development meeting scheduled for May 24.

On May 23, we will meet with Drs. Bram and Horn to discuss research progress and plans. This meeting will be an all ARS meeting. Please be prepared to discuss your progress since the last meeting and your plans for the oncoming year. Visual aid equipment will be available if you desire to use it.

Also, Dr. Horn has requested a summary of each individual scientist's progress for the year. Please prepare such a summary using a format similar to the attached example from John Welch.

Other tentative plans include a visit in the plant. I believe that Drs. Bram and Horn plan to leave on Friday, May 25, so if you have any matters that you wish to discuss with either, you should plan to do at the earliest convenience.



United States
Department of
Agriculture

Agricultural
Research
Service

National
Program
Staff

Beltsville, Maryland
20705

April 19, 1990

SUBJECT: Annual Screwworm Research and Methods Development Planning Meeting

TO: J. H. Wyss, APHIS-IS, Regional Director
Mexico City, Mexico

C. J. Whitten, RL
Screwworm Research Laboratory
Tuxtla Gutierrez, Mexico

D. R. Nelson, RL
Insect Biochemistry RU
Fargo, ND

FROM: R. A. Bram, National Program Leader
Medical & Veterinary Entomology and Parasitology

E. Gersabeck
E. Gersabeck, APHIS-IS
Hyattsville, MD

In preparation for the annual Screwworm Research and Methods Development Planning Meeting scheduled to be held on May 24 at Tuxtla Gutierrez, Mexico, enclosed please find the tentative, jointly developed agenda. Please distribute, as appropriate, to individuals on your respective staffs who will be involved in the meeting.

As usual, we look forward to a stimulating and productive exchange of scientific and technical information.

cc:

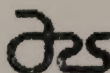
R. R. Oltjen, ARS

F. P. Horn, ARS

D. S. Campbell, APHIS-IS

Agricultural Attache, Mexico City

Enclosure



Agricultural
Research
Service

T E N T A T I V E A G E N D A

Screwworm Research and Methods Development
Planning MeetingTuxtla Gutierrez, Chiapas, Mexico
May 24, 1990

09:00	Call to Order and Introductions Welcome Status of Eradication Program Status of Current Production Strain - OW-87 Status of Candidate Strain - G-88 Development of a New Strain from Costa Rica Discussion	Bram/Irastorza Hofmann/Hidromiro Bailey/Martinez Mackley/Hernandez Ashley/Garcia Whitten
10:30	Milk Substitutes in Larval Diets Larval Diets Fortified with Selected Amino Acids Extenders for Gelled Larval Diets Handling and Use of Spent Gel Media Alternative Pupation Media Larval Diet Feeding Regimens Discussion	Ashley/Garcia Frieese Brewer Mackley/Hernandez/Taylor Brewer Diez Mundo
NOON	Mathematical Models for Productions Models of Screwworm Population Dynamics Discussion	Ashley/Garcia Whitten
12:30	Lunch	
13:30	Status of Chilled Fly Tests Screwworm Ecology in Costa Rica Screwworm Attractant Research in Laboratory and Field Time Activity Budget of Adult Behavior Status of Genetic Markers Discussion	Bailey Welch Hammack/Welch Thomas Taylor
15:00	Compatibility of North African Screwworm with New World Strains Long-range Shipment of Irradiated Pupae Ecological Observation in North Africa Technical Cooperation with FAO and IAEA	Taylor Whitten Thomas Gersabeck/Whitten
16:30	Future ARS Plans Future Methods Development Plans Discussion	Whitten Ashley/Garcia
	Summary and Conclusions	Bram/Irastorza
17:00	Adjourn	

T E N T A T I V E A G E N D A

Screwworm Research and Methods Development
Planning MeetingTuxtla Gutierrez, Chiapas, Mexico
May 24, 1990

09:00	Call to Order and Introductions Welcome Status of Eradication Program Status of Current Production Strain - OW-87 Status of Candidate Strain - G-88 Development of a New Strain from Costa Rica Discussion	Bram/Irastorza Hofmann/Hidromiro Bailey/Martinez Mackley/Hernandez Ashley/Garcia Whitten
10:30	Milk Substitutes in Larval Diets Larval Diets Fortified with Selected Amino Acids Extenders for Gelled Larval Diets Handling and Use of Spent Gel Media Alternative Pupation Media Larval Diet Feeding Regimens Discussion	Ashley/Garcia Frieese Brewer Mackley/Hernandez/Taylor Brewer Diez Mundo
NOON	Mathematical Models for Productions Models of Screwworm Population Dynamics Discussion	Ashley/Garcia Whitten
12:30	Lunch	
13:30	Status of Chilled Fly Tests Screwworm Ecology in Costa Rica Screwworm Attractant Research in Laboratory and Field Time Activity Budget of Adult Behavior Status of Genetic Markers Discussion	Bailey Welch Hammack/Welch Thomas Taylor
15:00	Compatibility of North African Screwworm with New World Strains Long-range Shipment of Irradiated Pupae Ecological Observation in North Africa Technical Cooperation with FAO and IAEA	Taylor Whitten Thomas Gersabeck/Whitten
16:30	Future ARS Plans Future Methods Development Plans Discussion	Whitten Ashley/Garcia
	Summary and Conclusions	Bram/Irastorza
17:00	Adjourn	



United States
Department of
Agriculture

Agricultural
Research
Service

National
Program
Staff

Beltsville, Maryland
20705

April 19, 1990

SUBJECT: Annual Screwworm Research and Methods Development Planning Meeting

TO: J. H. Wyss, APHIS-IS, Regional Director
Mexico City, Mexico

C. J. Whitten, RL
Screwworm Research Laboratory
Tuxtla Gutierrez, Mexico

D. R. Nelson, RL
Insect Biochemistry RU
Fargo, ND

FROM: R. A. Bram, National Program Leader
Medical & Veterinary Entomology and Parasitology

E. Gersabeck, APHIS-IS
Hyattsville, MD

In preparation for the annual Screwworm Research and Methods Development Planning Meeting scheduled to be held on May 24 at Tuxtla Gutierrez, Mexico, enclosed please find the tentative, jointly developed agenda. Please distribute, as appropriate, to individuals on your respective staffs who will be involved in the meeting.

As usual, we look forward to a stimulating and productive exchange of scientific and technical information.

cc:

R. R. Oltjen, ARS
F. P. Horn, ARS
D. S. Campbell, APHIS-IS
Agricultural Attache, Mexico City

Enclosure

T E N T A T I V E A G E N D A

Screwworm Research and Methods Development Planning Meeting

Tuxtla Gutierrez, Chiapas, Mexico
May 24, 1990

09:00	Call to Order and Introductions Welcome Status of Eradication Program Status of Current Production Strain - OW-87 Status of Candidate Strain - G-88 Development of a New Strain from Costa Rica Discussion	Bram/Irastorza Hofmann/Hidromiro Bailey/Martinez Mackley/Hernandez Ashley/Garcia Whitten
10:30	Milk Substitutes in Larval Diets Larval Diets Fortified with Selected Amino Acids Extenders for Gelled Larval Diets Handling and Use of Spent Gel Media Alternative Pupation Media Larval Diet Feeding Regimens Discussion	Ashley/Garcia Friese Brewer Mackley/Hernandez/Taylor Brewer Diez Mundo
NOON	Mathematical Models for Productions Models of Screwworm Population Dynamics Discussion	Ashley/Garcia Whitten
12:30	Lunch	
13:30	Status of Chilled Fly Tests Screwworm Ecology in Costa Rica Screwworm Attractant Research in Laboratory and Field Time Activity Budget of Adult Behavior Status of Genetic Markers Discussion	Bailey Welch Hammack/Welch Thomas Taylor
15:00	Compatibility of North African Screwworm with New World Strains Long-range Shipment of Irradiated Pupae Ecological Observation in North Africa Technical Cooperation with FAO and IAEA	Taylor Whitten Thomas Gersabeck/Whitten
16:30	Future ARS Plans Future Methods Development Plans Discussion	Whitten Ashley/Garcia
	Summary and Conclusions	Bram/Irastorza
17:00	Adjourn	

AGENDA

SCREWORM RESEARCH AND METHODS DEVELOPMENT TECHNICAL MEETING

TUXTLA GUTIERREZ, CHIAPAS, MEXICO
MAY 24, 1990

R. BRAHM
MODERATOR

09:00	Call to Order	MVZ Irastorza / Dr. Wyss
09:10	Welcome	MVZ. Hidromiro / Dr. Hofmann
09:20	Status of the Eradication Program	MVZ. Vargas / Dr. Anderson
09:30	Introduction	Biol. Garcia / Dr. Ashley
09:40	Status of Strain G-88	MVZ. Luis Lopez Velazquez
09:50	Comparison of OW-87 and G-88 Strains	Biol. Irene Lopez GLz.
10:00	Coffee Break	
10:10	Evaluation of Complete Diet	Ing. Jose A. Villalobos
10:20	Utilization of Pelcer Gel-80 as a Substitute for the Horsemeat Patty	Erick Babilonia MSMB.
10:30	Screwworm Ecology in Costa Rica	Dr. J. Welch
10:40	Larval Diets Fortified with Selected Amino Acids	Dr. Friese
10:50	Extenders of Gelled Larval Diets	Dr. Brewer
11:00	Larval Diet Feeding Regimens	Biol. Diaz Mundo
11:10	Model of Screwworm Population Dynamics	Dr. J. Whitten
11:20	Ecological Observation in North Africa	Dr. Thomas
11:30	Alternative Pupation Media	Dr. Brewer
11:40	Screwworm Attractant Research in Field	Dr. J. Welch
11:50	Long-range Shipments of Irradiated Pupae	Dr. J. Whitten
12:00	Handling and Use of Spent Gel Diet	MVZ. Luis A. Alvarez
12:10	LUNCH	

13:00	Time-Activity Budget of Adult Screwworm Behavior	Dr. Thomas
13:10	Technical Cooperation with IAEA	Dr. J. Whitten
13:20	Status of Chilled Fly Tests	MVZ. Martinez / Ing. Ed Hughes
13:30	Future Methods Development Plans	Biol. Garcia / Dr. Ashley
13:40	Research Support for Mass Rearing: Production Department Perspective	MVZ. Hernandez / Dr. Mackley
13:50	Future ARS Plans	Dr. J. Whitten
14:00	Summary and Conclusions	MVZ. Irastorza / Dr. Wyss
14:20	Refreshments	
14:30	Meeting Adjourn	

U. S. Department of Agriculture
Agricultural Research Service
National Program Staff

FACSIMILE TRANSMISSION

Facsimile Number: FTS: 344-5467
COM: (301) 344-5467

FROM: Ralph A. Bram
National Program Leader
Medical & Veterinary Entomology
and Parasitology
BARC-West, Bldg. 005, Rm. 211
Beltsville, Maryland 20705
Phone: FTS: 344-2771
COM: (301) 344-2771

TO:

Jim Whitten

COMMENTS/INSTRUCTIONS:

For information

NUMBER OF PAGES (including cover page):

3

DATE:

4-20-90



United States
Department of
Agriculture

Agricultural
Research
Service

National
Program
Staff

Beltsville, Maryland
20705

April 19, 1990

SUBJECT: Annual Screwworm Research and Methods Development Planning Meeting

TO: J. H. Wyse, APHIS-IS, Regional Director
Mexico City, Mexico

C. J. Whitten, RL
Screwworm Research Laboratory
Tuxtla Gutierrez, Mexico

D. R. Nelson, RL
Insect Biochemistry RU
Fargo, ND

FROM: *L.A. Bram*
R. A. Bram, National Program Leader
Medical & Veterinary Entomology and Parasitology

E. Gersabeck
E. Gersabeck, APHIS-IS
Hyattsville, MD

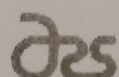
In preparation for the annual Screwworm Research and Methods Development Planning Meeting scheduled to be held on May 24 at Tuxtla Gutierrez, Mexico, enclosed please find the tentative, jointly developed agenda. Please distribute, as appropriate, to individuals on your respective staffs who will be involved in the meeting.

As usual, we look forward to a stimulating and productive exchange of scientific and technical information.

cc:

R. R. Oltjen, ARS
F. P. Horn, ARS
D. S. Campbell, APHIS-IS
Agricultural Attache, Mexico City

Enclosure



Agricultural
Research
Service



United States
Department of
Agriculture

Agricultural
Research
Service

National
Program
Staff

Beltville, Maryland
20705

April 18, 1970

SUBJECT: Annual Network Research and Methods Development Planning Meeting

TO: J. H. Wynn, ARS-75, Regional Director
Mexico City, Mexico

C. L. Wilton, JR.
Network Research Laboratory
Tuxtla Gutierrez, Mexico

D. E. Nelson, JR.
Tuxtla Gutierrez, Mexico

FROM: A. A. Bean, National Program Leader
National Veterinary Entomology and Parasitology
Laboratory, ARS-15
Beltsville, MD

is preparation for the annual Network Research and Methods Development
Planning Meeting scheduled to be held on May 18 at Tuxtla Gutierrez, Mexico.
entitled please find the tentative, jointly developed agenda. Please
distributed, as appropriate, to individuals on your respective staffs who will
be involved in the meeting.

As usual, we look forward to a stimulating and productive exchange of
scientific and technical information.

cc: E. E. Olson, ARS
R. E. Hunt, ARS
D. E. Campbell, ARS-15
Agricultural Research, Mexico City

Enclosure

T E N T A T I V E A G E N D A

Screwworm Research and Methods Development
Planning MeetingTuxtla Gutierrez, Chiapas, Mexico
May 24, 1990

09:00	Call to Order and Introductions Welcome Status of Eradication Program Status of Current Production Strain - OW-87 Status of Candidate Strain - G-88 Development of a New Strain from Costa Rica Discussion	Bram/Irastorza Hofmann/Hidromiro Bailey/Martinez Mackley/Hernandez Ashley/Garcia Whitten
10:30	Milk Substitutes in Larval Diets Larval Diets Fortified with Selected Amino Acids Extenders for Gelled Larval Diets Handling and Use of Spent Gel Media Alternative Pupation Media Larval Diet Feeding Regimens Discussion	Ashley/Garcia Friese Brewer Mackley/Hernandez/Taylor Brewer Diez Mundo
NOON	Mathematical Models for Productions Models of Screwworm Population Dynamics Discussion	Ashley/Garcia Whitten
12:30	Lunch	
13:30	Status of Chilled Fly Tests Screwworm Ecology in Costa Rica Screwworm Attractant Research in Laboratory and Field Time Activity Budget of Adult Behavior Status of Genetic Markers Discussion	Bailey Welch Hammack/Welch Thomas Taylor
15:00	Compatibility of North African Screwworm with New World Strains Long-range Shipment of Irradiated Pupae Ecological Observation in North Africa Technical Cooperation with FAO and IAEA	Taylor Whitten Thomas Gersabeck/Whitten
16:30	Future ARS Plans Future Methods Development Plans Discussion	Whitten Ashley/Garcia
	Summary and Conclusions	Bram/Irastorza
17:00	Adjourn	

U. S. Department of Agriculture
Agricultural Research Service
National Program Staff

FACSIMILE TRANSMISSION

Facsimile Number: FTS: 344-5467
COM: (301) 344-5467

FROM: Ralph A. Bram
National Program Leader
Medical & Veterinary Entomology
and Parasitology
BARC-West, Bldg. 005, Rm. 211
Beltsville, Maryland 20705
Phone: FTS: 344-2771
COM: (301) 344-2771

TO:

*Jim Whitten**&**Dennis Nelson*

COMMENTS/INSTRUCTIONS:

NUMBER OF PAGES (including cover page):

2

DATE:

5/2/90



United States
Department of
Agriculture

Agricultural
Research
Service

National
Program
Staff

Beltsville, Maryland
20705

May 2, 1990

SUBJECT: ARS Screwworm Research Review

TO: C. J. Whitten, RL
Screwworm Research, Tuxtla Gutierrez, Mexico

D. R. Nelson, RL
Insect Biochemistry RU, Fargo, ND

FROM: R. A. Bram, NPL *R. A. Bram*
Medical & Veterinary Entomology and Parasitology

As indicated in the joint memorandum from Bram and Gersabeck of April 19, the Annual Screwworm Research and Methods Development Planning Meeting will be held on May 24, 1990, at Tuxtla Gutierrez, Mexico. This annual get together also provides an ideal opportunity for in-house review of our own program of research just prior to the exchange with the Methods Development group.

I, therefore, wish to request that we plan to meet at the ARS facility in Tuxtla Gutierrez on Wednesday, May 23, 1990, at 9:00 a.m., to review our current program and plan future initiatives. Each scientist who will be present in Tuxtla Gutierrez on that date should be prepared to present a 20-30 minute discussion of current research and future plans. Following these presentations and the discussion they may stimulate, we will develop an agency strategy for the future, including realistic funding needs.

cc:

R. R. Oltjen
F. P. Horn
T. J. Army



United States
Department of
Agriculture

Agricultural
Research
Service

National
Program
Staff

Beltsville, Maryland
20705

May 2, 1990

SUBJECT: ARS Screwworm Research Review

TO: C. J. Whitten, RL
Screwworm Research, Tuxtla Gutierrez, Mexico

D. R. Nelson, RL
Insect Biochemistry RU, Fargo, ND

FROM: R. A. Bram, NPL *R. A. Bram*
Medical & Veterinary Entomology and Parasitology

As indicated in the joint memorandum from Bram and Gersabeck of April 19, the Annual Screwworm Research and Methods Development Planning Meeting will be held on May 24, 1990, at Tuxtla Gutierrez, Mexico. This annual get together also provides an ideal opportunity for in-house review of our own program of research just prior to the exchange with the Methods Development group.

I, therefore, wish to request that we plan to meet at the ARS facility in Tuxtla Gutierrez on Wednesday, May 23, 1990, at 9:00 a.m., to review our current program and plan future initiatives. Each scientist who will be present in Tuxtla Gutierrez on that date should be prepared to present a 20-30 minute discussion of current research and future plans. Following these presentations and the discussion they may stimulate, we will develop an agency strategy for the future, including realistic funding needs.

cc:

R. R. Oltjen
F. P. Horn
T. J. Army

Progress Report
Frank D. Parker
Canas, Costa Rica

Studies were completed in cooperation with John Welch.

1. PROBLEM. Estimating native populations of screwworm adults.

APPROACH. Populations of adult screwworms were captured using two attractants, marked and released in three habitats in Costa Rica during consecutive 60 days studies in both the dry and wet seasons.

FINDINGS. Using the Lincoln Index, an estimate of the wild population was made. Data derived from attractants placed in pastures indicated from 1.7 to 5.4 females/day. When data from sheep wounds in wooded areas was used the estimates rose from 4.6 to 9.4 females/day. When liver data from wooded areas was used the estimates rose much higher, from 13.7 to 71.8 females/day. Although fewer females were captured on sheep wounds as compared to those captured on rotted liver (881:3129), the percentage of "sheep-visiting" females that were recaptured was higher than the percentage of "liver-visiting" females.

INTERPRETATION. The influence of habitat, season and kind of attractant must be considered in order to accurately estimate the population of wild screwworm adults. Using data from these studies the rates of releases of sterile flies would vary from 2700 to 35,900 adults/square mile. The cost factors and effectiveness of the releases at these widely divergent rates are obvious.

FUTURE PLANS: Continue sampling populations using different attractants to more accurately predict size of the wild population and how it changes with season and habitat.

2. PROBLEM. Pollen diversity on wild screwworm adults.

APPROACH. Pollen was removed from screwworm adults captured on sheep at three locations in Costa Rica. The pollen was identified by a cooperator in Columbia.

FINDINGS. Nineteen types of pollen were separated belonging to 12 plant families. Many of these were represented by single pollen grains and may have been contaminants. Flies with numerous pollen grains visited composites, euphorbs, combretids, ulmaids, and bignonids. These plants are shrubs, vines and understory trees. The number of plant species visited at a single location was limited.

INTERPRETATION. Knowledge of what plants screwworm adults visit, may aid researchers in locating adults populations at the floral sources and fragrances obtained from floral extracts might be

used to trap adults.

FUTURE PLANS: Continue to sample adults collected in different life zone and at different seasons of the year in order to determine the diversity of floral visitations.

3. PROBLEM. Identification of host animals fed on by wild screwworm adults.

APPROACH. Wild screwworm females were collected at both sheep wounds and liver bait stations. Forty-eight adults were dissected and the gut contents were removed, placed on filter paper, and dried. Later the filter paper was used in an enzyme-linked immunosorbent assay (ELISA).

FINDINGS. Sixteen of the 48 fly sample were positive for sheep and two were positive for bovines. The other 62.5 % were unknown and these were presumed to be wild animals. The only sheep in the area were our test animals. Cattle, on the other hand, were common in the surrounding pastures but they did not appear to be the common hosts for the screwworm. At this time of the year, abiotic factors (temperature and humidity) may confine the flies to moist wooded areas. Our sampling of sites in pastures support these conclusions since only 8% of the flies visiting sheep and 2% of the flies visiting liver were recorded from pastures; more than 92% of the flies were recorded from wooded sites.

INTERPRETATION. This tests was the first time the ELISA method was used to determine the host reservoir for this important parasite. Using serum from both wild and domestic animals in the area where flies are collected, may enable researchers to accurately determine the extent and importance of domestic and wild animals in the population dynamics and life cycle of the screwworm in tropical habitats.

FUTURE PLANS: Continue collecting screwworm adults and making dissections from diverse habitats and in different season. The samples can be maintained dry for extended periods.

4. PROBLEM. Determining the influence of season and habitat on population levels of screwworm adults.

APPROACH: Feeding and ovipositional stations (sheep and rotted liver) were maintained for 60 consecutive days in both the dry (Jan. 23 to March 24) and wet (Sept. 1 to Oct. 30) seasons. Numbers of adults visiting the feeding stations were recorded daily. To accurately estimate the population individuals were uniquely marked and released.

FINDINGS: More female flies were observed in the wet season than in the dry season at both types of stations (2817 vs 1193). The degree of difference in population levels between seasons ranged from 0.9 to 2.4 times greater at sheep sites and from 2.7 to 3.2 times more flies at liver sites in the wet season. Habitat accounted for the greatest difference in population

levels since 3.5 and 3.7 times more flies were collected from sheep in wooded sites as compared to pasture sites and liver sites in wooded areas attracted 18.1 and 22.3 times more flies as compared to liver in pasture sites. Liver was a better attractant than were sheep wounds since between 1.3 and 4.8 times more flies were collected with liver.

INTERPRETATION. The population level of screwworm flies in wooded habitats ranged between 18.1 and 22.3 times higher than in pasture habitats. These differences should be considered when sterile fly releases are being planned to effectively use the available numbers of sterile flies. Perhaps more effective control could be obtained if habitat evaluations were made prior to flight patterns to maximize the rate of sterile fly releases.

FUTURE PLANS: Continue estimating populations levels in different habitats and at different times of the year to accurately estimate the population of screwworms.

Manuscripts

Parker, Frank D. and John B. Welch. 1990. Field comparisons of five attractants for the screwworm fly in a tropical dry forest in Costa Rica (Diptera: Calliphoridae). J. Econ. Entomol. Accepted pending revision.

Parker, Frank D. and John B. Welch. 1990. A method of obtaining primary screwworm egg masses from females collected on rotted liver (Diptera: Calliphoridae). J. Econ. Entomol. Rejected by reviewer and editor as not being important. In the process of communicating why it is important.

Parker, Frank D. and John B. Welch. 1990. Influence of attractants on behavior of screwworm flies in a tropical wet forest in Costa Rica (Diptera: Calliphoridae). J. Econ. Entomol. (submitted to journal).

Parker, Frank D. and John B. Welch. 1990. Liver feeding stations for monitoring populations of the screwworm fly (Diptera: Calliphoridae). Ann. Entomol. Soc. Amer. (in preparation).

SCREWWORM RESEARCH - STATUS REPORT

DONALD B. THOMAS

MAY 1990

The present report summarizes the status of research projects and special assignments begun or completed since the last Joint ARS-APHIS screwworm research meeting in May 1989.

I. RESEARCH PROJECTS

1. Reproductive Ecology of Wild Screwworms in the New World Tropics.

This research was conducted at locations in Belize and the Yucatan Peninsula of Mexico with the objective of obtaining data on the behavior and reproductive capacity of wild females. The work was cooperative research with Robert L. Mangan and was completed in 1988, the published results appeared in 1989.

- a) Thomas, D.B. & R.L. Mangan. 1989. Oviposition and wound-visiting behavior of the screwworm fly, Cochliomyia hominivorax (Diptera: Calliphoridae). Ann. Entomol. Soc. Am. 82:526-534.
- b) Mangan, R.L. & D.B. Thomas. 1989. Habitat preferences and dispersal patterns in native female screwworm flies (Diptera: Calliphoridae). Ann. Entomol. Soc. Am. 82: 332-339.

2. Mortality and Morbidity of the Pupal Stage of the Screwworm.

This research was conducted in response to the bola-boliche problem in the production plant and its effect on emergence rate. The studies were conducted at the screwworm facility in Tuxtla Gutierrez with the object of obtaining information on the natural mortality rate of the pupal stage and a study of the causes of mortality and malformations in the pupal stage in the production plant. Some of the research was conducted in cooperation with Robert L. Mangan. The research was completed in 1988. Some of the results were published in 1989 with one manuscript now in press.

- a) Thomas, D.B. 1989. Survival of the pupal stage of the screwworm, Cochliomyia hominivorax (Coquerel) (Diptera: Calliphoridae) in subtropical Mexico. J. Entomol. Res. 24: 321-328.
- b) Thomas, D.B. & R.L. Mangan. 1990. Pupal malformations in the screwworm with special reference to the bola-boliche syndrome. Southw. Entomol. (in press).

3. Age Structure of Native Screwworm Populations.

This research is ongoing in cooperation with Andrew C. Chen and Frank D. Parker. The objective of the research is to study the population dynamics of the screwworm by using an age structure approach. This should reveal information on the longevity of flies in the wild and the numbers of egg clutches (infestations) produced by a fly in its lifetime. The initial phase of the work was conducted in Guatemala with plans for continuing experiments in Costa Rica next fall. One manuscript was published in 1989 and another is currently in press.

- a) Thomas, D.B. & A.C. Chen. 1989. Age determination in the adult screwworm (Diptera: Calliphoridae) by pteridine levels. J. Econ. Entomol. 82:1140-1144.
- b) Thomas, D.B. & A.C. Chen. 1990. Age distribution of adult female screwworms captured at sentinel animals in the coastal lowlands of Guatemala. J. Econ. Entomol. (in press).

4. Serological Analysis of Screwworm Myiasis: Host-Parasite Interaction.

This project is undertaken in cooperation with John H. Pruett and is being conducted on the grounds of the screwworm facility in Tuxtla Gutierrez with the laboratory analysis at the Kerrville ARS lab. The initial studies have been completed and recently published. We have plans to refine the information with further studies on antibody kinetics this summer. At the present time we are awaiting the arrival of materials for serological preparations at Tuxtla.

- a) Thomas, D.B. & J.H. Pruett. 1990. Antibodies to antigens of Cochliomyia hominivorax (Coquerel) (Diptera: Calliphoridae) in the sera of infested sheep, a serological technique for the detection of screwworm myiasis. J. Entomol. Sci. 25:143-149.

5. Behavior of Screwworm Flies in an Outdoor Cage.

The purpose of this research was to use a Time-Activity budget approach to quantifying the salient aspects of adult screwworm behavior. This project was completed in 1989. A manuscript has been through the peer review process and submitted to the area office for approval. A presentation of results was given at the annual ESA meeting in San Antonio in December 1989.

- a) Thomas, D.B. (In Litt.). Time-Activity Budget of Adult Screwworm Behavior (Diptera: Calliphoridae). Submitted to J. Med. Entomol.

6. Dynamics of Sterile Releases.

This project was completed in 1988 and was conducted in cooperation with Robert L. Mangan, John B. Welch and Frank D. Parker. The study was conducted in Belize in 1987 and 1988. The objective of the research was to assess the longevity of released, sterile, plant-reared flies and their interactions with native flies. One manuscript has been accepted for publication, a second manuscript is now in preparation.

- a) Mangan, R.L., D.B. Thomas & J.B. Welch. 1990. Estimation of native screwworm (Calliphoridae: Diptera) reproductive activity by release and recapture of sterile females. Environ. Entomol. (in press).

7. Factors Affecting Screwworm Oviposition.

This project is ongoing and is being conducted at the ARS laboratory at Tuxtla Gutierrez. The objective is to isolate some of the factors which influence clutch size and oviposition rate in the screwworm. To date we have been able to document differences due to behavior, temperature and strain. I am looking at the effects of nutrition, especially in regard to the uptake of wound fluids at the time of oviposition on a second oviposition.

II. SPECIAL ASSIGNMENTS

1. Screwworm Outbreak in North Africa.

In cooperation with the International Atomic Energy Administration (IAEA) and the Food and Agriculture Organization of the United Nations (FAO) I devoted a significant part of the last year to the screwworm outbreak in Libya. Here in Tuxtla I met several times with visiting agriculture specialists from Libya, Australia and Egypt in order to advise them on the ecology of the screwworm and methods for studying populations in the wild. I conducted studies here at Tuxtla in support of the proposed shipment of pupae to North Africa. A report on this study, the survival of pupae when packed in ice chests under hypoxic conditions for long distance shipment, was submitted to IAEA in August 1989.

From September to December 1989 I served as a consultant to the FAO in Rome, Italy on the screwworm outbreak. I traveled to five of the countries at risk to an extension of the outbreak in North Africa (Egypt, Sudan, Niger, Tchad, Tunisia). I met with animal health authorities there in order to advise them on quarantine and detection procedures. A major objective of the consultancy was to visit the region at risk to assess the potential for control of an outbreak. At the end of my consultancy in December I prepared a report for the FAO outlining my recommendations and my perspective as a screwworm ecologist. This report was circulated to ARS scientists likely to be involved in further consultancies when an eradication program is finally implemented.

- a) Survival of Screwworm Pupae stored in Ice Chests. Report by D.B. Thomas submitted to IAEA through R.A. Bram, 8/89.
- b) Plan for the Eradication of the New World Screwworm Cochliomyia hominivorax (Coquerel) from North Africa. Donald B. Thomas: Consultant Report TCP/RAB/8955(E), Food and Agriculture Organization, Rome. 12/89.

PROGRESS REPORT

23 May 1990

John B. Welch

Research Entomologist/Location Leader
San Jose, Costa Rica

1. Mark-release-recapture study of sterile screwworm fly dispersal associated with canyons in mountainous areas (Sumidero study).
STATUS: Data summarization and manuscript in progress.
Conclusions: flies disperse freely across, up and down the mountain face regardless of position of release site and natural topographical features such as canyons; more fly movement in the direction with the wind than in other directions; collections of flies by WOT are greater during the periods when fewer leaves are present on forest vegetation than when the forest is in full foliage.
Estimated 1 manuscript: Welch, J. B., and Peterson, R. D. Dispersal of released sterile screwworms, Cochliomyia hominivorax (Diptera: Calliphoridae) in a mountainous area of southern Mexico. In preparation for Environ. Entomol.
IMPACT: Provides information on dispersal behavior of sterile flies in a previously unstudied area.
2. Mark-release-recapture study of dispersal behavior in relation to a powerline right of way.
STATUS: Manuscript, "Observations on Dispersal of Sterile Screwworms (Diptera: Calliphoridae) in Relation to a Clear-Cut Utility Right of Way in Southern Mexico," published in J. Econ. Entomol. 82(6): 1580-1584 (1989).
IMPACT: Provides information on dispersal in relation to a man-made topographic feature.
3. Mark-release-recapture study of vertical distribution of flies in relation to habitat.
STATUS: Analysis of sterile fly data is complete. Collection of native fly data using WOTs and SL-4 in Costa Rica is complete. Identification of other blowfly species collected is in progress. Manuscript, "Vertical distribution of sterile released and native screwworm flies (Diptera: Calliphoridae), in relation to habitat," by J. B. Welch and F. Ramirez B. in planning for Environ. Entomol.
IMPACT: Provides information on sterile and fertile fly dispersal behavior in relation to vegetation type and

height of canopy.

4. Screwworm reproductive activity and population dynamics in Belize.
STATUS: Manuscript, Estimation of Native Screwworm (Diptera: Calliphoridae) Reproductive Activity and Recapture of Sterile Females," by R. A. Mangan, D. B. Thomas and J. B. Welch in press for J. Med. Entomol.
IMPACT: Elucidate impact of sterile fly release on native screwworm reproductive activity.
5. Predation of ground released sterile screwworms by spiders and ants.
STATUS: Reference collection of 127 specimens of spiders representing ca. 28 species.
Reference collection of 4 species of ants.
IMPACT: Manuscript, Predation of ground released screwworm flies (Diptera: Calliphoridae) by spiders in a mountainous area of southern Mexico," by J. B. Welch, submitted for Area Office for publication in J. Arachnol.
IMPACT: Provides information on predation of ground released flies in southern Mexico.
6. Larval spine/survival study by R. L. Mangan and J. B. Welch
STATUS: Experiment completed and data collection in progress.
IMPACT: Provides information on larval spine morphology and survival in relation to substrate of pupation.
7. Larval/pupal mortality under field conditions in the wet and dry tropics of Central America.
STATUS: Data collection and ant identification completed.
Data analysis in progress.
IMPACT: Provides information on larval/pupal mortality factors in forest and pasture habitats of a wet and dry tropical environment.
8. Cooperated with R. L. Mangan on larval spine morphology study.
STATUS: Manuscript, "Classification of Screwworms (Cochliomyia hominivorax (Coq.)) by Larval Spine Morphology," by R. L. Mangan and J. B. Welch in press for J. Med. Entomol.
IMPACT: Larvae classified by area of Central and North America from which they were collected.
9. Cooperated with R. L. Mangan, D. B. Thomas, F. D. Parker and F. Ramirez B. in field study in Belize (1988).
STATUS: Ovary and pollen samples have been completed for the

- study in cooperation with F. D. Parker. Results suggest that both sterile and fertile flies are visiting the same plant species.
- IMPACT: Additional information on ecology, population dynamics and reproductive status of screwworm flies.
10. Study of Postfeeding Screwworm Larval Dispersal in Relation to Pet Carriers.
- STATUS: Manuscript, "Escape of Screwworm (Diptera: Calliphoridae) Larvae from Pet Carriers," by J. B. Welch and F. Ramirez B., in in-house peer review for submission to J. Econ. Entomol. as a scientific note.
- IMPACT: Provides information of larval escape from containers. Information should be important to APHIS and other control personnel.
11. Study of Pollen Collected from Screwworms in the Tropics.
- STATUS: Collections of pollen samples have been made in conjunctions with mark-recapture studies in wet and dry habitats of Costa Rica and areas of Guatemala and Belize in cooperation with F. D. Parker. Results suggest that male and female flies (both native and sterile released) are visiting the same flowers.
- IMPACT: Provide ecological information on screwworm fly activity off host animals and possibly lead to future attractants for adult trapping systems.
12. Development of Artificial Wound Trap.
- STATUS: Cooperating with O. Jara B. and F. D. Parker in further development of the trap. Oviposition by screwworm flies on traps in the laboratory has been achieved.
- IMPACT: Replace the use of sentinel animals for the collection and study of adult screwworm populations.
13. Investigation into the Feasibility of Training and Using a Dog to Detect Screwworms.
- STATUS: A dog has been successfully trained to detect screwworm infested wounds and pupae. Manuscript, "A Detector Dog for Screwworms (Diptera: Calliphoridae)," by J. B. Welch is in press for J. Econ. Entomol.
- IMPACT: Demonstrates that dogs can be trained to detect screwworm infested animals and pupae. Detector dogs at quarantine stations and airports would greatly assist in the prevention of introduction of screwworms into screwworm-free areas.

14. Investigations into Screwworm Population Dynamics in Tropical Wet and Dry Habitats of Costa Rica.
STATUS: Investigations in cooperation with F. D. Parker continue. Results of two 60-day mark-release-recapture studies in the dry habitat include more flies were captured in edge and forest sites than in pasture sites during the rainy season and more flies were captures in forest and edge sites during the dry season.
IMPACT: Provides additional information on screwworm ecology and population dynamics. Increased accuracy of population estimation and interpretation of population dynamics is possible.
15. Investigations of egg stage development in ovaries of screwworms.
STATUS: Samples from Guatemala, Belize and Costa Rica have been processed and data analysis is in progress.
IMPACT: Provides information on reproductive and age status of screwworm populations.
16. Investigations into the collection of screwworms using liver, fish and blood.
STATUS: Manuscript, "Field compoarisons of five natural attractants for the screwworm fly (Diptera: Calliphoridae) in a dry forest in Costa Rica," by F. D. Parker and J. B. Welch has been accepted for publication in J. Econ. Entomol. Manuscript, "Influence of attractants on behavior of screwworm flies in a tropical wet forest in Costa Rica (Diptera: Calliphoridae)," by F. D. Parker and J. B. Welch has been submitted to J. Econ. Entomol.
IMPACT: Provides information on attractancy of different baits and efficiency of collections techniques. As a result, wounded, infested sentinel animals are no longer used in Costa Rica for collecting screwworms.
17. Collection of screwworm strains using liver as an attractant.
STATUS: Manuscript, "A Method for Obtaining Screwworm Egg Masses from Females Collected on Rotted Liver (Diptera: Calliphoridae)," by F. D. Parker and J. B. Welch was recently rejected by J. Econ. Entomol. The first author is writing a rebuttal and the manuscript will be resubmitted.
IMPACT: Eliminate the use of wounded, infested sentinel animals.
18. Investigations of male screwworm behavior and population dynamics at

feeding stations.

STATUS: Data have been collected for the dry and rainy seasons in the wet and dry tropical habitats.

IMPACT: Behavior and population dynamics of a large number of wild screwworm males will provide useful information on behavior and dispersal patterns.

19. Investigation of trapping efficiency between liver on the ground and liver baited Bishopp traps.

STATUS: Data collection and analysis have been completed in cooperation with F. D. Parker.

IMPACT: Increased efficiency of trapping technology is important for research and control programs.

20. Study of adult screwworm fly weights.

STATUS: Cooperating on this work with F. D. Parker with additional morphometric data being collected.

IMPACT: Provides information on characteristics of screwworm populations.

21. Annual meeting of the Entomological Society of America.

STATUS: Participated in annual meeting of ESA, 10-14 December 1989, San Antonio, TX.
Presented paper, "Studies of Pollen Collected from Screwworm Flies in Central America," by J. B. Welch and F. D. Parker.

IMPACT: Disseminated information concerning the study of screwworm ecology using identification of pollen.

22. Invited speaker at annual meeting of the American Mosquito Control Association.

STATUS: Participated in Remote Sensing of Mosquito Habitats Symposium at annual meeting of AMCA, 1-5 April 1990, Lexington, KY.
Presented paper, "Use of Aerial Color Infrared Photography to Locate Mosquito Oviposition Sites," by J. B. Welch.

IMPACT: Represented ARS and disseminated information on use of an economical and efficient survey technique for mosquito breeding sites.

23. Invited speaker for University of Delaware "Semester Abroad" entomology course.

STATUS: Presented paper, "Screwworm Biology, Ecology and Research in the Tropics," by J. B. Welch, 15 May 1990,

University of Costa Rica, San Jose, Costa Rica.

IMPACT: Disseminated scientific information concerning screwworms and USDA-ARS research in tropical environments.

24. Investigation of the use of Enzyme Linked Immunosorbent Assay (ELISA) to identify bloodmeals of screwworm flies.

STATUS: Worked at Walter Reed Institute of Research with Drs. Robert A. Wirtz and Leon L. Robert, Jr., 6-12 April 1990. Screwworms tested positive for up to 60 hrs (the longest samples analyzed) after having fed on sheep wounds. Samples from laboratory reared and fed flies and wild caught flies were also analyzed.

IMPACT: Proves efficacy of this technique in the analysis of screwworm bloodmeals. Previous research has shown that screwworm flies visit wounds twice as often to feed as to oviposit (and they generally feed after oviposition) and analysis of bloodmeal samples should provide important insight into what hosts the screwworms are actually visiting. Also, this technique can be adapted to identify sources of carbohydrates that the flies are feeding upon.

25. Served as Location Leader of the USDA-ARS Screwworm Research Program in San Jose, Costa Rica, 10 June 1985 - present.

STATUS: Investigated the possibility of moving an ARS scientist, MAG veterinarian, and technicians to the MAG experiment station, Enrique Jimenez Nuñez, near Cañas to create working space for additional ARS scientist to be stationed in San Jose and to increase the efficiency and productivity of the research program in Costa Rica. Negotiated with the director of the experiment station and the head of the Animal Health and Livestock Production of MAG to acquire laboratory and office space. Facilities were provided by MAG gratis to ARS for the establishment of the new field laboratory.

IMPACT: A permanent field laboratory is available for use by ARS and other visiting scientists for conducting screwworm research in Costa Rica.

26. Served as Official Duty Officer for the American Embassy, San Jose, Costa Rica.

STATUS: Served as Official Duty Officer 7-14 June 1989.

IMPACT: Fulfilled ARS obligation to support American Mission in Costa Rica and fulfilled American Mission's obligation to provide services to American citizens on a 24 hr basis.

RESEARCH PLANS FOR NEXT 12 MONTHS

1. Study native screwworm dispersal patterns in Costa Rica.
2. Study vertical distribution of native flies in Costa Rica.
3. Study larval/pupal mortality due to predation, parasitization and other factors in the forest and pasture habitats of the wet and dry tropical environments of Central America.
4. Study screwworm fly emergence in forest and pasture habitats of the wet and dry tropical environments of Central America.
5. Continue investigations into the use of a screwworm detecting dog.
6. Conduct bloodmeal analysis of screwworm flies collected in tropical habitats.
7. Cooperate in these and/or other studies with Orlando Jara B., Frank D. Parker, Donald B. Thomas, Robert A. Wirtz, Leon L. Robert, Jr., and other USDA, Costa Rican, and Walter Reed Institute of Research scientists.

MANUSCRIPTS

- Welch, John B. 1989. Observations on Dispersal of Sterile Screwworms (Diptera: Calliphoridae) in Relation to a Clear-Cut Utility Right of Way in Southern Mexico. J. Econ. Entomol. 82:1580-1584.
- Welch, J. B., J. K. Olson, W. G. Hart, S. G. Ingle and M. R. Davis. 1989. Use of Aerial Color Infrared Photography as a Survey Technique for Psorophora columbiae oviposition habitats in Texas ricelands. J. Am. Mosq. Control Assoc. 5:147-160.
- Welch, J. B., J. K. Olson, M. M. Yates, A. R. Benton, Jr., and R. D. Baker. 1989. Conceptual Model for the Use of Aerial Color Infrared Photography by Mosquito Control Districts as a Survey Technique for Psorophora columbiae oviposition habitats in Texas ricelands. J. Am. Mosq. Control Assoc. 5:369-373.
- Welch, John B. A Detector Dog for Screwworms (Diptera: Calliphoridae). In press for the J. Econ. Entomol.
- Mangan, Robert L. and John B. Welch. Classification of Screwworm Larvae (Cochliomyia hominivorax (Coq.)) by Larval Spine Morphology. In press for J. Med. Entomol.
- Mangan, Robert L., Donald B. Thomas and John B. Welch. Estimation of Native Screwworm (Diptera: Calliphoridae) Reproductive Activity and Recapture of Sterile Females. In press for Environ. Entomol.
- Parker, Frank D. and John B. Welch. Field Comparisons of Five Natural Attractants for the Screwworm Fly (Diptera: Calliphoridae) in a Tropical Dry Forest in Costa Rica. Accepted for publication by J. Econ. Entomol.
- Parker, Frank D. and John B. Welch. A Method for Obtaining Screwworm Egg Masses from Females Collected on Rotted Liver. Rejected (To be resubmitted) J. Econ. Entomol.
- Parker, Frank D. and John B. Welch. Influence of Attractants on Behavior of Screwworm Flies in a Tropical Wet Forest in Costa Rica (Diptera: Calliphoridae). Submitted to J. Econ. Entomol.
- Welch, John B. Predation of Ground Released Screwworm Flies (Diptera: Calliphoridae) by Spiders in a Mountainous Area of Southern Mexico. Submitted for approval to send to the J. Arachnol. for publication.
- Welch, John B. and Freddy Ramirez B. Escape of Screwworm Larvae (Diptera: Calliphoridae) from Pet Carriers. In in-house peer review for submission to J. Econ. Entomol. as a scientific note.
- Welch, John B. and Richard D. Peterson. Dispersal of Released Sterile Screwworms (Diptera: Calliphoridae) in a Mountainous Area of Southern Mexico. In preparation for Environ. Entomol.
- Welch, John B. and Freddy Ramirez B. Vertical Distribution of Sterile

Released and Native Screwworm Flies (Diptera: Calliphoridae) in
Relation to Habitat. In planning for Environ. Entomol.

RESEARCH PROGRESS

C.J. Whitten

COLONIZATION GENETICS:

1. Data from tests for determining the inheritance of asymmetric mating behavior have been analyzed. Manuscript "The Genetics of Asymmetric Mating Behavior in Screwworms" is in preparation for submittal to J. of Heredity.
2. Research concerning the genetics of the rate of ovarian development in female screwworms has been completed. Data have been analyzed and manuscript "The Genetics of Ovarian Development in Screwworms" is in preparation to be submitted concurrently with manuscript above.
3. Gas chromatographic analyses of cuticular hydrocarbons have been completed from female screwworms derived from classical genetic crosses between lab-adapted and non lab-adapted strain. Data are being entered into the computer for analysis to identify hydrocarbon groups that may be used as genetic markers in strain monitoring. Manuscript in planning for J. of Heredity.
4. The development of a new strain of screwworms was planned to begin in February but unsuitable environmental conditions inside the ARS area of the plant have delayed the work. Plans are to develop the strain from 16 lines of screwworms collected in Costa Rica.

POPULATION MODELING

1. Data from 2 additional field evaluations have been incorporated into data set for regression analyses. Manuscript "Genetic Manipulations of Screwworm Populations" in review stage with co-author.
2. Data have been refined to provide a model for evaluating observed field sterility collected on a short term basis. The objective of this model is to provide a means of comparing results of future field evaluations that are necessarily short term because of budget constraints. Validation of the model will be attempted with data from future evaluations.

FUTURE PLANS

1. Develop new strain to provide to Methods Development.
2. Begin genetic monitoring (electrophoresis, mating behavior, rate of reproductive development, cuticular hydrocarbon analyses) of newly developed strain from Costa Rica to provide baseline data.
3. Identify candidate translocation lines and conduct laboratory studies to assess each line's capability for population suppression.

Progress Report

May 23, 1990.

F. D. Brewer. Research Entomologist
Tuxtla Gutierrez, Chiapas. Mexico.

1. Use of two Bulk Materials in Larval Diet of the Screwworm Cochliomyia Hominivorax (Diptera: Calliphoridae) for Extending or Replacing a Gelling Agent. F. D. Brewer.

STATUS:

Manuscript completed and in review for J. of Econ. Entomol.

SUMMARY:

Larvae developed for 5 consecutive generations on 24 formulated meridic diets using different particle sizes of corn cob grit material as a partial or total replacement for a sodium polyacrylamide polyacrylate gelling agent. Sawdust was also tested with one size of the corn cob grits as a possible gel extender in the diet. There were no significant differences ($P=0.05$) between insects reared on control diet and experimental diets in respect to fecundity, fertility, mean pupal weight, pupal yield, adult emergence and malformation.

IMPORTANCE:

The use of these bulk materials could represent considerable cost-savings in the diet by reduction in usage of expensive gelling agent.

2. Use of Inert, Non-Nutritive Nutshell Materials In Screwworm Larval Diet as Gel-Sparing Ingredients.

STATUS:

The data has been collected and statistically analyzed. Manuscript in preparation for J. of Entomol. Sciences.

SUMMARY:

Ground pecan shell and peanut hull were added in a 8% final volume concentration to the larval diet to reduce the Water Lock gelling agent by 80%. There were significantly less ($P=0.05$) pupae produced on both types of experimental diets containing the ground nutshells when compared to pupal yield from control diet without bulk material or diet containing corn cob grits to reduce the Water Lock. There were no significant differences for fecundity, fertility, mean pupal weight and percent pupal malformation among the control or

IMPORTANCE:

Provide information on use and suitability of bulk materials as gel extenders in the larval diet.

3. Use of Ground Corn Cob Material as a Pupation Medium for the Screwworm Larvae.

STATUS:

The data has been collected and statistically analyzed. Manuscript in preparation for J. of Econ. Entomol.

SUMMARY:

Four particle sizes or grades of grit-ó cobs^R were found suitable when compared to sawdust the control in the study. No significant differences ($P=0.05$; Duncan's Multiple Range Test) were observed among the treatments for the pupal and adult data except pupal weight was lower from larvae pupating on one of the cob grades. In a separate test evaluating particle size 2040 grit-ó cobs^R and sawdust in the ARS laboratory and in the Plant no significant differences were observed among the pupal and adult parameters measured under these two separate environments.

IMPORTANCE:

Usage of the ground cob as a pupation medium for the larvae represents a suitable and acceptable source of material.

4. Varying feeding schedules in time and quantity of food offered to the Screwworm larvae.

STATUS:

Data collection and analysis has been completed from 3 separate tests and data summarization is currently underway. The experimental feeding regimes were evaluated against a control of 500 ml of diet / day provided for 4 consecutive days (2000 ml diet total / 100 mg eggs). Pupal and adult parameters such as pupal yield, mean pupal weight, adult emergence, fecundity, and fertility were analyzed for variance among the control and experimental groups.

Estimated 1 manuscript: Brewer, F.D. Variations in Feeding Regimes for Screwworm Larvae Propagation in the Laboratory. In planning for the Annals of the E.S.A.

IMPORTANCE:

Provide information on dietary requirements of the larvae for optimum growth / development.

Summary of Projects Completed

STATUS: Data has been collected and analyzed for the following two projects. Each project is being considered as a part of the same manuscript.

1. Five different final volume concentrations of a technical grade Casein (90% protein; 0.5%, lactose) were formulated in the larval diet in lieu of the powdered milk and evaluated along with the control diet containing milk. Weights were taken from 2- and 5-day old larvae and 5-day old pupae. Other data taken were pupal yield, percent adult emergence by sex, percent pupal and adult malformation, percent adult mortality by sex and fecundity.

2. Larvae were reared for 2 consecutive generations on diet with and without milk. Parameters measured were pupal yield, mean pupal weight, percent adult emergence by sex, fecundity, fertility and malformation in pupae and adults.

IMPORTANCE:

Provide information on nutritional requirements of different aged larvae.

STATUS:

Data has been collected from the following projects but has not been statistically analyzed. The plans for the analyzed data are given for each project.

1. Flies fed three adult diets gelled with carrageenan along with those feeding on the control diet of honey and water were checked through time for weight by sex, mortality by sex, fecundity and fertility. The experimental diets were formulated with water, gel and sucrose plus either powdered whole egg or powdered whole egg and powdered nonfat milk or powdered whole egg, powdered nonfat milk and dried bovine blood. The test was replicated 5 times. A manuscript is in the planning for this study and should be important to add to the knowledge of adult screwworm nutritional requirements in reference to optimum performance in colony propagation and mass production.

2. A gelling agent with the trademark name Aridall 1125 (American Colloid Company) was formulated in both the larval and an adult diet in the same concentration as Water Lock in the control diet. The larval diet study was designed for 5 consecutive generations and the adult diet study for 6 consecutive generations. Parameters measured in the larval diet study were pupal yield, mean pupal weight, malformed pupae, adult emergence by sex, malformed adults, adult mortality by sex, fecundity and fertility. Parameters measured in the adult diet study, were mortality by sex, fecundity and fertility. A manuscript is in the planning to incorporate both studies which should provide further information to the literature about larval gelled diets and new information about gelled adult screwworm diet.

3. Larvae (Guatemala -88 strain) were reared on diet with and without powdered nonfat milk and weighed at 6-hour intervals commencing shortly following egg hatch. Six different time interval measurements were taken in this study with a weighing of 250 larvae/interval. This study is earmarked for part of a manuscript and should be important in providing additional information on the nutrition of the early aged larvae.

4. Daily body weights were taken on larvae 2-7 days post-hatch, pupae 1-5 days in age and adults by sex, 1-7 days in age. This study is being planned as part of a manuscript and should be important for providing growth/ development information for all phases of the life cycle in relationship to nutrition.

5. A peanut meal material was formulated in the larval diet at 7 different final volume concentrations of 0.52, 1.04, 1.55, 2.05, 2.55, 4.18 and 6.15% and compared to the control diet with no peanut meal. Larval, pupal and adult parameters were measured and recorded. This study is being planned as part of a manuscript pertaining to larval nutrition.

SUMMARY OF CURRENT RESEARCH PROPOSALS
F. D. BREWER

1. The development of a formulation that can serve as a starting medium or initiation diet to promote optimum growth / development for the early aged larvae, e.g., 0-56 hours post hatch, is now being planned. The evaluation of new materials and chemicals along with varying quantities of each in the formulations will be utilized in the experimental approach. Data will be collected and analyzed from all phases of the life cycle and in particular during the larval growth phase. The presently used larval diet gelled with Water Lock will serve as the control diet.

No estimated time for completion of the work can be given since relatively little is known about this type of research.

2. In cooperation with the Methods/Development and Production Sections of APHIS the following research areas will be initiated. Each of these three studies will be conducted in both the ARS Laboratory and under the Plant rearing conditions. Data will be collected and analyzed from all phases of the life cycle including data specifically needed for decision making and program planning for small-scale research propagation and large-scale Plant production. -Estimated time of completion for each project is six months.

A. An evaluation of an existing pre-formulated larval diet, with the exception of gel and formol, has been experimentally outlined. The control diet will be the presently used larval diet.

B. The evaluation of selected gelling agents for solidifying the larval diet is being planned. These materials will be tested in the larval diet with the Water Lock gelled diet serving as the control diet. These experimental gels may also be evaluated for feeding acceptability by adults when used to solidify a water based formulation of sugar: milk: egg(2:1:1).

C. A ground cob material of Mexican origin, processing and manufacturing will be evaluated against the control material grit-ó cobs^R (U.S.A. product) in regards to its suitability as a gel extender in the larval diet and as a pupation medium. This material is commercially available and is more economical than the U.S.A. product.

